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(71)Applicant : RICOH CO LTD

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(72)Inventor : KANEKO TETSUYA

NAGAI KIYOFUMI

MURAKAMI KAKUJI

KAWANISHI TOSHIYUKI

YANAGISAWA MASAHIRO

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(54) REGENERATING METHOD OF MATERIAL TO BE RECORDED AND IMAGE
REMOVAL ACCELERATING LIQUID COMPOSITION USED IN THIS REGENERATING
METHOD

(57)Abstract:

PURPOSE: To provide a regenerating method of a material to be recorded and image removal accelerating liquid which improve the characteristic to remove image forming materials, such as film image forming materials and electrophotographic toners, having thermoplasticity or hot meltability, from the material to be recorded and make it possible to obtain the good characteristic to remove the image forming materials even at the time of imparting a small amt. of the image removal accelerating liquid.

CONSTITUTION: This regenerating method of the material to be recorded comprises applying the image removal accelerating liquid to the material which is to be recorded and is formed by composing at least the part near the front surface on the side to be formed with the images of a layer to be swollen by liquid contg. water (the image removal accelerating liquid) and fixing the film-like image forming materials thereon to weaken the adhesive power of the film-like images of the material to be recorded and the material to be recorded and peeling the hydrophobia images from the paper- base layer by an image peeling means. The image removal accelerating liquid. described above contains an alkylsulso-succinate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image removal promotion liquid which uses the recorded material with which the front face where image formation is carried out at least fixed by the copying machine, the printer, thermal transfer printer, or hot melt ink jet of an electrophotography method, and carried out image formation of the image formation matter of thermoplasticity or thermofusion nature near the front face of the recorded material which is the layer swollen with the liquid containing water for the playback approach and this playback approach of changing into a reusable condition.

[0002]

[Description of the Prior Art] A printer form and a copying paper have come to be used in large quantities by the latest automation. Therefore, it has come to cause to the problem of aggravation of the earth environment by felling of a forest. Conventionally, the ink of the form used once etc. was removed and (deinking) ** (ed) to this problem, it became empty again, and the approach only had using as playback used paper. However, in OA used paper, since a printing method differs from the usual printing, it is difficulty deinking or difficulty bleaching, and there were problems, like only with the conventional playback technique, although it is difficult and deinking of a toner is studied, [Tappi Journal, March, 102 (1986), etc. and a system] are large-scale, and cost becomes high so that Iwasaki and others (the paper pulp technical Times, and [33, 6] (1990)) might point out. However, the alphabetic character image on the paper used once is removed by cleaning, and paper reusable to a copy or printing is developed recently. For example, the mark is put on the recorded material which came to carry out mold release processing, and carried out this mold release processing only on the front face of a sheet-like base material, especially one side at JP, 4-67043, A, and what was distinguished from the regular paper is indicated. However, this has a problem in there being problems, like difficulty is in fixable in special paper, and using it as a common copying paper. Moreover, although removing an image by ultrasonically the toner on a recorded material in the organic solvent which dissolves this is indicated by JP, 1-101576, A and JP, 1-101577, A, a problem is in a public nuisance, or ignition and the toxicity by the organic solvent, and there is a problem in using it at general office and a general home. What was formed with bad paper or a bad ceramic of plastics, a metal, and liquid permeability etc. as an image recorded material is used for JP, 1-297294, A, the exfoliation object of thermofusion nature is made to intervene, the image formed on this recorded material is heated, and although the cleaning approach which exfoliates an image from a recorded material is indicated, the special form which performed mold release processing must be used for a front face. then, the quality of paper to which, as for these people, at least the part used cellulose fiber as the principal component in JP, 5-202557, A previously -- the liquid which contains water in this recorded material is sunk in using the recorded material which consisted of layers -- making -- quality of paper -- a layer and ink -- ** -- where adhesive strength is weakened, the pressure welding of a recorded material and the exfoliation member is carried out -- making -- quality of paper -- the approach of exfoliating heat flexibility ink from a layer was proposed. This approach is an

approach which was excellent in respect of the point which can reproduce the copying paper used ordinarily and a printer form, safety, etc. however, in the playback approach concerning said JP,5-202557,A, in order to remove the image formation matter completely By having to give image removal promotion liquid in large quantities, and giving it in large quantities The problem that the energy spent in order to dry the image removal promotion liquid given in playback actuation of a recorded material will become large, The problem of being easy to generate a trouble in the electrical circuit of regenerative-apparatus inside and outside by the component (for example, water) of a lot of image removal promotion liquid generated by desiccation, The waist of a recorded material became weaker under the problem of being easy to generate the corrosion and mold of rust etc., and the effect of the water further contained in the component in the image removal promotion liquid, especially image removal promotion liquid, the jam of the recorded material within a regenerative apparatus was generated, and problems, such as a problem from which conveyance becomes difficult, arose. Moreover, there was a trouble that the heat applied at the time of image exfoliation, a pressure, etc. need to be controlled precise since the refreshable process conditions to which the class of the image formation matter removable until now or recorded material is limited are narrow, and the dependability over regeneration with the expensive cost of a regenerative apparatus was low etc. As a result of these people's repeating examination about said invention for the purpose of solving the trouble in said invention which applied, the playback approach of said invention is considered to have used the phenomenon which can weaken the adhesive strength of the image formation matter and a recorded material with image removal promotion liquid, and are presumed to be the following things to which it solves and playback of a recorded material is performed in an operation. That is, by giving image removal promotion liquid first to the recorded material with which the coat-like image was formed, image removal promotion liquid permeates a recorded material, and a recorded material swells. Since stress arises in the interface of the recorded material swollen with image removal promotion liquid, and the coat-like image formation matter hardly swollen with image removal promotion liquid and exfoliation arises between a recorded material and the image formation matter as a result of swelling of a recorded material, the adhesive strength of a recorded material and the coat-like image formation matter declines. After the adhesive strength of a recorded material and the coat-like image formation matter declines, the image formation matter is removed from on a recorded material by the image removal means. Finishing of removal of the liquid component to which the recorded material with which the image formation matter was removed from the front face by the above-mentioned approach remains in a recorded material at a desiccation process if needed, smoothing, etc. is performed, and a reuse playback recorded material is obtained.

[0003]

[Objects of the Invention] This invention is solving the fault of the above-mentioned conventional technique. That is, one purpose of this invention is to offer the playback approach of a recorded material that improve the removal property from the recorded material of the image formation matter of having the thermoplasticity or thermofusion nature of the coat-like image formation matter, the toner for electrophotography, etc., and the removal property of the good image formation matter is especially acquired at the time of grant of little image removal promotion liquid, and image removal promotion liquid. Other purposes of this invention are to offer the playback approach of a recorded material and image removal promotion liquid from which the image formation matter is removable, without improving the removal property from the recorded material of the image formation matter, and accompanying the front face of a recorded material by damage on recorded materials, such as rough ****, especially at the time of grant of little image removal promotion liquid. Other purposes of this invention are to offer the playback approach of a recorded material and image removal promotion liquid which can extend the range of the class of the image formation matter with which the removal property of the good image formation matter is acquired, or recorded material. Other purposes of this invention are to offer the playback approach of a recorded material and image removal promotion liquid from which an image is removed, without damaging a recorded material, after giving the above to the recorded material which can extend refreshable process conditions and can extend the range of the class

of the image formation matter with which the removal property of the good image formation matter is acquired, or recorded material also in a cheap regenerative apparatus.

[0004]

[Elements of the Invention] This invention consists of layers swollen with the liquid (image removal promotion liquid) with which water is contained near [in which an image is formed at least] the near front face. And image removal promotion liquid is made to give the recorded material which the coat-like image formation matter has fixed. In the playback approach of the recorded material characterized by exfoliating with an image exfoliation means from a layer after it weakens the adhesive strength of the coat-like image of this recorded material, and this recorded material and adhesive strength declines -- said hydrophobic image -- quality of paper -- It is in the image removal promotion liquid used for the playback approach of a recorded material and this playback approach which are characterized by said image removal promotion liquid containing alkyl sulfo succinate. After weakening the adhesive strength of the image formation matter and a recorded material with image removal promotion liquid as mentioned above by the playback approach in this invention, in order to carry out the image formation matter, use of various removal means is possible. For example, the approach of scratching the image formation matter with a blade, a brush, etc. physically, The approach give supersonic vibration, and make removal ***** and a recorded material crooked and the rigid difference of the image formation matter and a recorded material separates the image formation matter, How to strip off the image formation matter on an adhesive member and a superposition recorded material, The image formation matter is plasticized or dissolved and the approach of separating a recorded material and an exfoliation member into the image formation matter and the exfoliation member to paste up from a recorded material strongly, contact or after carrying out a pressure welding and pasting up the image formation matter, and stripping off from a recorded material etc. is mentioned.

[0005] The recorded material which has the layer swollen with the image removal promotion liquid which contains water near [in which an image is formed at least] the near front face as a recorded material reproduced by the playback approach of this invention is ***** . Although the paper which uses polysaccharide naturally-occurring polymers, such as cellulose fiber, as a principal component, for example, the copy which consists of paper of fine quality and a report grade paper especially, or a printing form is mentioned as the example, the compound record material which prepared paper, such as hydrophilic synthetic high polymers, such as poly vinyl alcohol, and cellulose fiber, on the member of the shape of a sheet which consists of a synthetic high polymer other than these general newspapers can be used preferably.

[0006] The print processes using the hot printing method using electrophotography and a thermofusion nature ink sheet using the dry type toner and the wet toner as the formation approach of the image removed by the playback approach of this invention, the ink jet method using hot melt ink or the offset version, letterpress, and a mimeograph are mentioned. That an image is formed in the shape of a coat on a recorded material (refer to drawing 5), and the amount of swelling of the image formation matter by grant of image removal promotion liquid differs from the amount of swelling of a recorded material are the conditions on which the image formation matter is removed from a recorded material by the approach of this invention. Therefore, in the above-mentioned image formation approach, when not fulfilling these conditions, this invention cannot remove the image formation matter on a recorded material. On the contrary, if these conditions are fulfilled, playback of the recorded material by this invention can be applied, without being limited to the above-mentioned image formation approach. The image formation matter means that it is hardly in the condition that the recorded material is adsorbed with the molecular level like [here / at the time of printing by that the shape of a coat does not necessarily mean that the whole image forms one film like drawing 5 , and the image formation matter has not only permeated the interior of a recorded material deeply, and the water color ink containing a color]. Moreover, in this invention, after giving image removal promotion liquid, in the approach of sticking an exfoliation member and a recorded material, imprinting the image formation matter on a recorded material to an exfoliation member by heating and pressurization, and removing the image formation matter, it is required to use the thing of thermoplasticity or thermofusion nature as image

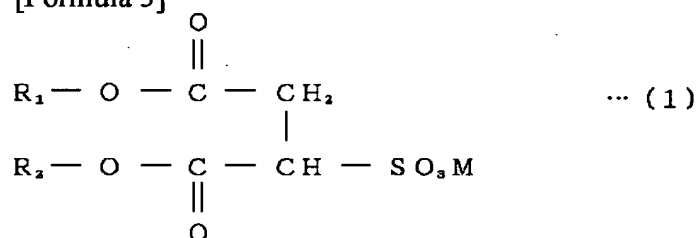
formation matter. As an example of said thermoplasticity or the thermofusion nature matter, the usual dry-type electrophotography toner, thermal-ink-transfer-printing record ink, the object for ink jets, or the hot melt ink for printing is mentioned. Generally, although the image formation matter of such thermoplasticity or thermofusion nature consists of color material, such as resin of thermoplasticity or thermofusion nature, and a pigment, a color. As an example of the resin of thermoplasticity or thermofusion nature Polystyrene, polyacrylic acid alkyl, polymethacrylic acid alkyl, A styrene-acrylic nitril copolymer, a styrene-acrylic copolymer, A styrene-butadiene copolymer, a polyamide, polyethylene, polypropylene, alkyd resin, an epoxy resin, polyvinyl acetate, an ethylene-vinyl acetate copolymer (EVA), unsaturated polyester, a polyvinyl chloride, silicone resin, etc. are mentioned. In the record ink for hot printing, the ink for ink jets, and the hot melt ink for printing, various waxes, a rosin (abietic acid) derivative, etc. are used as a vehicle. Moreover, an oil color is also used although inorganic and an organic pigment, for example, carbon black, the Quinacridone derivative, a phthalocyanine derivative, benzoin yellow, etc. are mentioned as a color material contained in the image formation matter.

[0007] As an ingredient which an image exfoliation member is a member for making it paste up with the image formation matter on a recorded material, and imprinting and exfoliating from a recorded material, and constitutes this image exfoliation member, like adhesive tape, although what applied the adhesion matter on the film is usable. As an exfoliation member used by making it paste up after heating the image formation matter and plasticizing or fusing, it is required to indicate the above adhesive property and thermal resistance to be the image formation matter to some extent. As an example of the exfoliation member which can be used by making it paste up after setting to this invention, heating the image formation matter and plasticizing or fusing. For example, polyisoprene rubber, neoprene rubber, chloroprene rubber, silicone rubber, Epoxy resins, such as synthetic rubber, such as butadiene rubber and a fluororubber, natural rubber, and a bisphenol A polycarbonate resin, Amino resin, such as butyl-ized melamine formaldehyde resin and benzoguanamine formaldehyde resins, Phenol system heat-curing resin, such as terpene phenol resin, phenol ether resin, and phenol resin, A polyvinyl chloride, polyvinylidene chloride, and vinylidene-chloride-acrylonitrile copolymer, A vinyl chloride vinyl acetate copolymer, an ethylene-vinylacetate copolymer, An ethylene-tetrafluoroethylene copolymer, polyvinylidene fluoride, A vinyl copolymer polyvinyl butyral, a polyvinyl formal, polypropylene, Vinyl system polymers, such as polyethylene, poly butyl acrylate, polymethacrylic acid, Acrylic resin [, such as polymethylmethacrylate,], polyimide, 6, and 6-nylon, Polyamides, such as 6-nylon, a polycarbonate, polyether sulphone, A polyether ether ketone, polyethylene terephthalate, polyethylenenaphthalate, Polyester, such as aromatic polyester, polyphenylene sulfide, Synthetic resin thermoplastic [, such as the Pori Para Balin acid, polyether nitril, and aramid] or thermosetting, A metal and its oxide stainless steel, such as nickel, iron, and aluminum, Metal alloys, such as metals, such as aluminum, and the oxide of those, nickel steel, stainless steel, a Fe-nickel alloy, a Co-aluminum alloy, Monel, Inconel, and duralumin, a ceramic ingredient, etc. can be mentioned. Said thermoplastic or thermosetting resin can be used as a blend, or it can alloy-ize it, and it can compound by adding other additives, such as glass fiber, a whisker, carbon, a silica, and titanium oxide, etc., and it not only uses it independently, but can use it. Moreover, although these ingredients can be used also by the monolayer, a laminating can also be carried out in order to raise properties, such as improvement in endurance, and an exfoliation property. As for the optimal exfoliation member ingredient, it is advantageous that repeating and using an exfoliation member lowers playback cost although it should be selected by the class of image formation matter which is going to exfoliate, the class of image formation matter, and image formation matter removal process conditions etc. in respect of versatility, and in that case comparatively high thermal resistance and surface stability are required. As an example of a desirable exfoliation member, polyethylene terephthalate, polyethylenenaphthalate, a polyether ether ketone, polyphenylene sulfide, the Pori Para Balin acid, polyether nitril, aramid, polyimide, polyether imide, stainless steel, nickel, and alumite are mentioned from the removal property and endurance of an image. This invention can be carried out even if what was formed in which configuration of the shape of the shape of a sheet, the

letter of a block, a drum, or a roller is used for an exfoliation member.

[0008] Next, it describes about the image removal promotion liquid used for this invention. The image removal promotion liquid used for this invention uses water as the base as a principal component. However, when using two or more sorts of image removal promotion liquid for removal actuation of the image formation matter, each image removal promotion liquid of not all necessarily have to make water a subject. In this invention, that by which water is contained in either of two or more sorts of image removal promotion liquid is used also in such a case. At least one sort of alkyl sulfo succinate of the description of the image removal promotion liquid used for this invention is that at least one sort of alkyl sulfo succinate is added as a surfactant. The removal property from a good recorded material was shown, the image removal promotion liquid which added at least one sort of alkyl sulfo succinate has the effectiveness that an image is removable, without hurting one's recorded material front face for the image formation matter from a recorded material also in the still more nearly little amount of grants, and found out excelling in safety, preservation stability, etc., and this invention person reached this invention. In the approach of giving image removal promotion liquid at once, the image removal promotion liquid which surely contained alkyl sulfo succinate is used by this invention. By the approach by which image removal promotion liquid is divided and given to multiple times to the same recorded material, or the playback approach using two or more sorts of image removal promotion liquid, alkyl sulfo succinate does not need to contain in two or more image removal promotion liquid of all. As alkyl sulfo succinate used by this invention, although you may be monoalkyl sulfo succinate or dialkyl sulfo succinate, especially the dialkyl sulfo succinate shown by the bottom formula (1) is desirable.

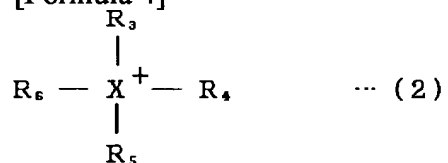
[Formula 3]



(The inside of a formula, R1, R2: The same or the alkyl group of the carbon numbers 4-14 which may be different from each other and may branch, M: alkali-metal ion, the 4th class ammonium, the 4th class phosphonium, alkanolamine cation)

When M of a before type (1) furthermore uses the dialkyl sulfo succinate chosen from the group which consists of sodium ion, a lithium ion, the 4th class ammonium shown by the bottom formula (2), the 4th class phosphonium, and an alkanolamine cation, aging of image removal promotion liquid is small, and since the stable removal property is acquired, it is still more desirable.

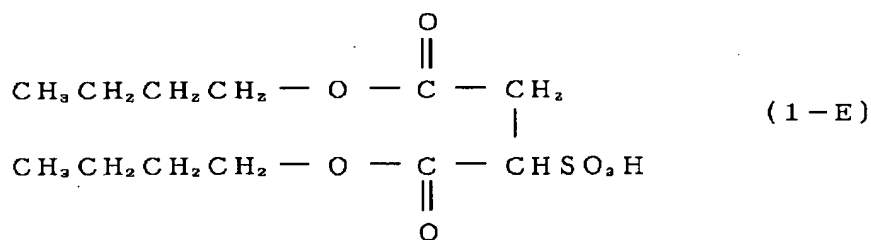
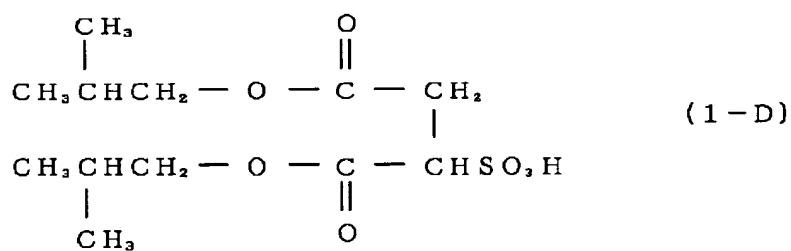
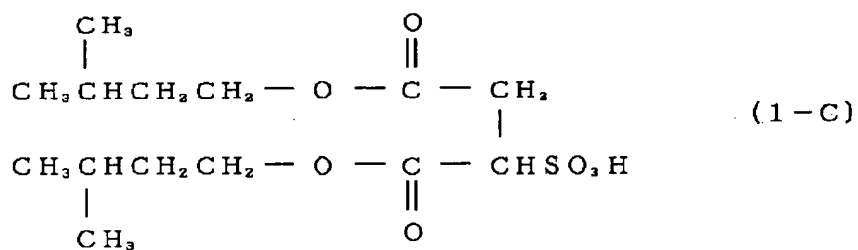
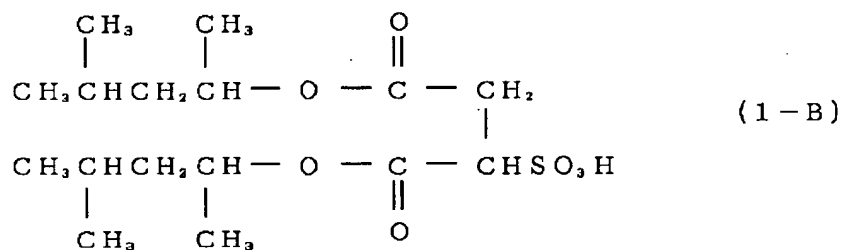
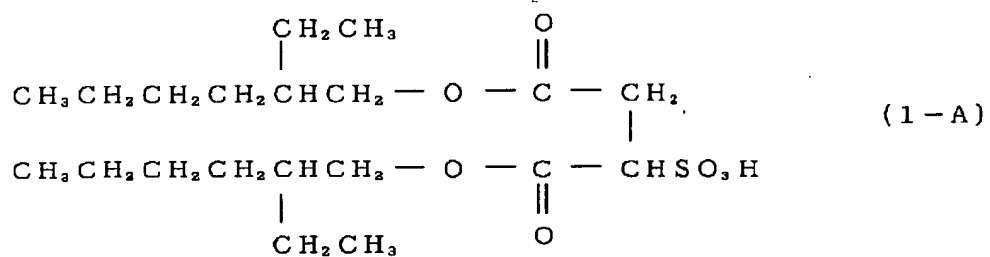
[Formula 4]



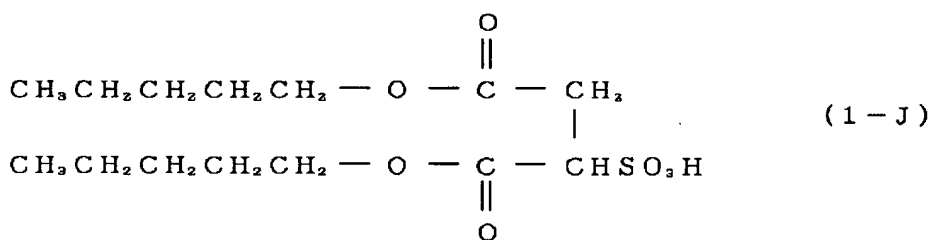
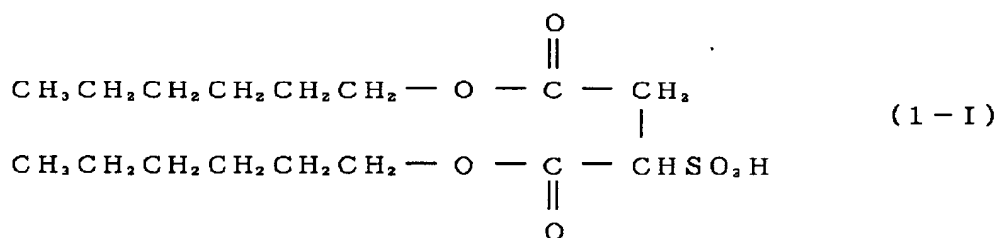
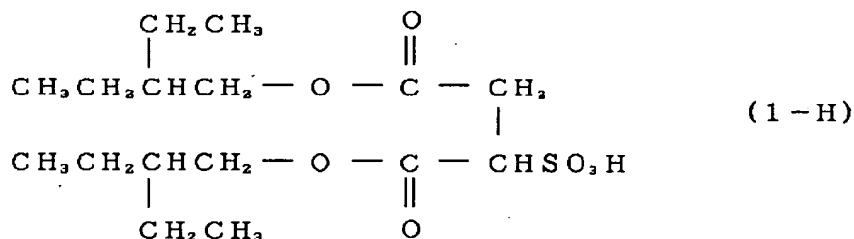
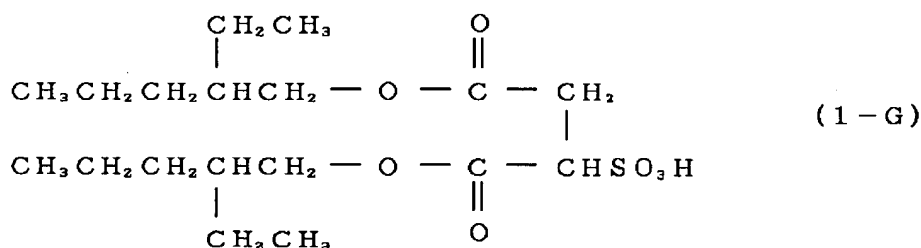
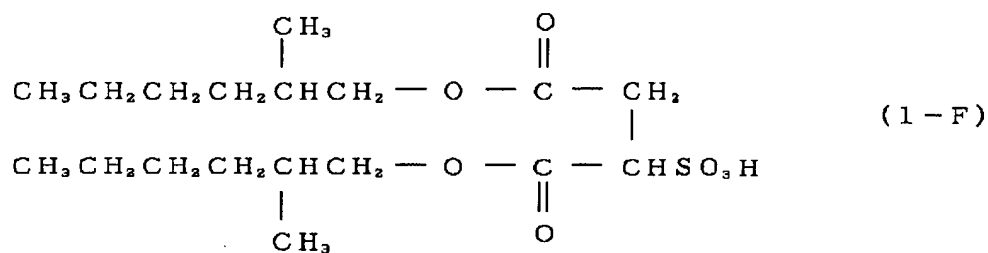
(For the inside of a formula, and X, nitrogen or Lynn, and R3-R6 are hydrogen, the alkyl group of carbon numbers 1-4, a hydroxyalkyl radical, and an alkyl halide radical)

[0009] Next, although a free-acid mold shows below the example of the surfactant used for this invention, the surfactant used for this invention is not limited to the following.

[Formula 5]



[Formula 6]

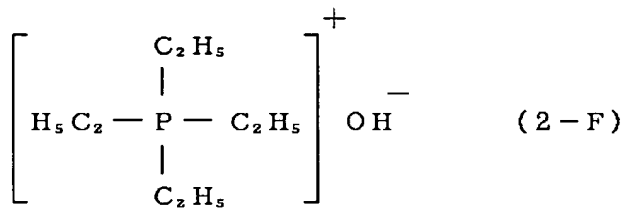
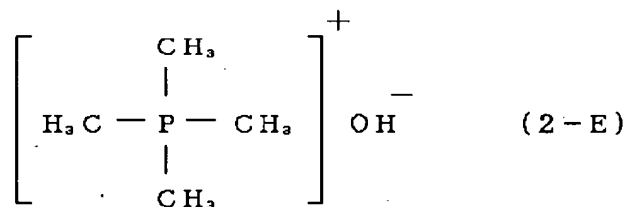
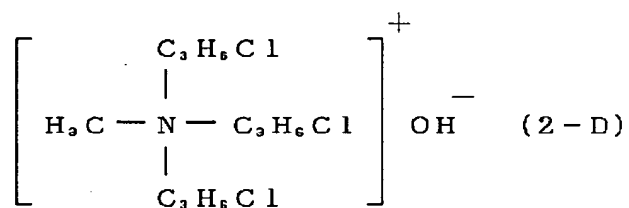
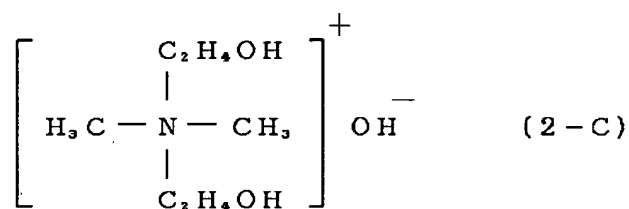
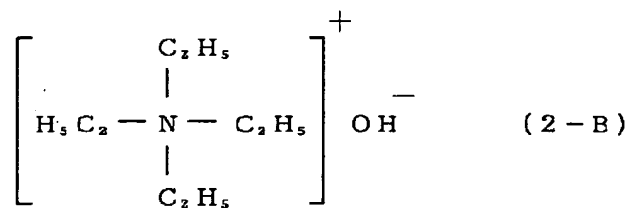
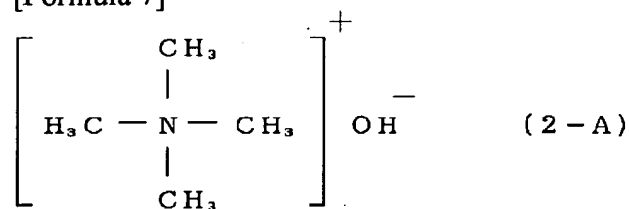


Although aerosol IB45, aerosol AY100, aerosol MA 80, aerosol OT 100, aerosol TR70 (above Mitsui Cyanamid make), the air roll alumnus 70 (Toho Chemical make), Neocol (Dai-Ichi Kogyo Seiyaku make), Pelex OT-P (Kao make), etc. are mentioned as a surfactant of marketing which contains these surfactants as a principal component, it is not limited to these. The addition of these surfactants is preferably added in 0.1 - 5% of the weight of the range 0.01 to 20% of the weight.

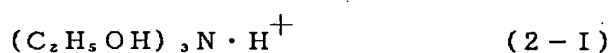
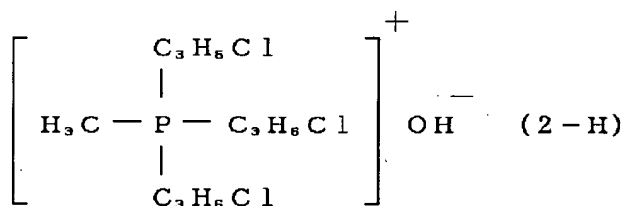
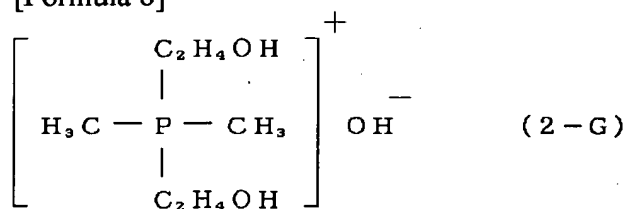
[0010] The image removal promotion liquid used for this invention can mix independence or two or more of those things, and said alkyl sulfo succinate can be used for it. Moreover, what mixed other surfactants other than alkyl sulfo succinate can be used. In the case of sodium salt and lithium salt,

production of the alkyl sulfo succinate used by this invention can introduce into the isolation salt which can introduce by adding a sodium hydroxide and a lithium hydroxide to a corresponding free acid, respectively, and corresponds when it is quarternary ammonium salt, phosphonium salt, and an alkanolamine cation by adding the hydroxide and alkanolamine which are shown in the following - (2-A) (2-I).

[Formula 7]



[Formula 8]



In order to acquire the removal property of the good image formation matter also in the passage of time, as for the amount of a hydroxide as shown by said formula (2-A) - (2-I), and alkanolamine, it is desirable to be added to the number of mols of a front-type (1) compound, so that it may become 50 % of the weight or more preferably 30% of the weight or more.

[0011] All the cation ion of the alkyl sulfo succinate used by this invention does not need to be chosen from the group which consists of alkali metal, the 4th class ammonium, 4th class phospho UNIMU, and an alkanolamine cation, and said some of cations may be cations other than the aforementioned group. From the case where it uses as a water solution independently, if a compound (1) is used together with fatty alcohol, it can obtain the image removal promotion liquid of the removal property which whose removal property improved further and was stabilized also in the passage of time. Ethanol, 2-propanol, propanol, a butanol, etc. are mentioned as an example of said fatty alcohol. The content of fatty alcohol is 0.01 % of the weight - 20% of the weight of the range, and can be added still more preferably in 0.1 % of the weight - 5% of the weight of the range.

[0012] In this invention, it describes about the reason the removal property of the good image formation matter is acquired also when the amount of grants to the recorded material of image removal promotion liquid is lessened especially, the reason the removal property of the good image formation matter is acquired by using alkyl sulfo succinate for image removal promotion liquid, and. In the playback approach of this invention, as it mainly mentioned above that the adhesive strength to the recorded material of the image formation matter declined by grant of image removal promotion liquid, it is presumed for shearing force to occur among both according to the difference of the amount of swelling of the coat-like image formation matter and a recorded material. Therefore, in order to reproduce a recorded material by processing of the rate which is used, it is required that it may be made to swell near [in which image removal promotion liquid permeates a recorded material promptly after grant, and the image is formed] the near recorded material front face as a property of the image removal promotion liquid given. It is presumed that the shearing force between the image formation matter and a recorded material becomes large especially when image removal promotion liquid permeates even the part near the interface which touches the image formation matter of a recorded material as much as possible. So, when image removal promotion liquid permeates even the interface which a recorded material and the image formation matter contact [image removal promotion liquid], the removal property of the good image formation matter is acquired. It not only produces the shearing force by swelling that image removal promotion liquid permeates even the interface which a recorded material and the image formation matter contact [image removal promotion liquid], but it is considered that the component of

image removal promotion liquid, especially water carry out the operation to which the adhesive strength which was working between the image formation matter and a recorded material by minding between the image formation matter and a recorded material is weakened.

[0013] In this invention, since the image removal promotion liquid containing alkyl sulfo succinate has the high wettability to the image formation matter and a recorded material, osmosis in a recorded material arises promptly and one of the reasons alkyl sulfo succinate gives the removal property of the good image formation matter is guessed for image removal promotion liquid to permeate even the interface of the image formation matter and a recorded material promptly especially. Moreover, after weakening the adhesive strength of a recorded material and the image formation matter by grant of image removal promotion liquid, heat the image formation matter, carry out a pressure welding to an exfoliation member, and give adhesive strength between an exfoliation member and the image formation matter, and an exfoliation member and a recorded material are separated after that. In the playback approach of removing the image formation matter on a recorded material, the removal property of an image formation object improves especially by using the image removal promotion liquid containing alkyl sulfo succinate. This effectiveness is presumed to be a thing based on the following operations. That is, in the playback approach of this recorded material, the process which heats the image formation matter and carries out a pressure welding to an exfoliation member brings about the operation to which the adhesive strength between the recorded materials and image formation matter which it not only carries out the operation which generates adhesive strength, but once deteriorated by grant of image removal promotion liquid between the image formation matter and an exfoliation member is raised again (this work is henceforth called a reattachment operation). The image removal promotion liquid containing alkyl sulfo succinate is considered to be in the 2nd operation of the image formation matter which carries out improvement in a removal property being decreased thru/or extinguished in the reattachment operation produced when carrying out the pressure welding of a recorded material and the exfoliation member after heating. Especially the aforementioned reattachment operation usually becomes remarkable, when the amount of grants to the recorded material of image removal promotion liquid is lessened. When giving the image removal promotion liquid with which water is especially contained when giving image removal promotion liquid to a recorded material in large quantities in large quantities, while the component of the image removal promotion liquid given to the recorded material, especially water weaken the adhesive strength of a recorded material and the image formation matter, it has the operation which prevents a reattachment operation arising. Therefore, especially the image removal promotion liquid containing alkyl sulfo succinate is effective in order to acquire the removal property of the good image formation matter, when the amount of grants to the recorded material of image removal promotion liquid is lessened.

[0014] These people as an approach by which the removal property of the image formation matter good also when little image removal promotion liquid is given is acquired between adhesion to the exfoliation member of the image formation matter, an exfoliation member, the approach of repeating separation of a recorded material two or more times about the same recorded material and the stuck recorded material, and exfoliation members -- " -- it shifted and the approach which you make it raw-** and adhesion to an exfoliation member and exfoliation of the image formation matter of multiple times produce was proposed for ". In this playback approach, since it is accompanied by the process in which adhesion to an exfoliation member and exfoliation of the image formation matter of multiple times are performed in order to acquire the removal property of the good image formation matter, in that process, it becomes important to maintain the front face of a recorded material so that the aforementioned reattachment operation may not arise. Especially in this approach, when the amount of grants to the recorded material of image removal promotion liquid is made below into about 3.2 mg/cm² (2 g/A -4), in order that using the image removal promotion liquid adjusted so that a reattachment operation might not arise may improve the removal property of the image formation matter, it has big effectiveness. Since the effectiveness of preventing a reattachment operation as mentioned above is also large, the image removal promotion liquid containing alkyl sulfo succinate is effective in giving good playback quality in the playback approach of the recorded material accompanied by the process in which adhesion and

exfoliation of an exfoliation member of the image formation matter of the aforementioned multiple times are performed especially. this invention person found out that the image formation matter on a recorded material was removable by grant of the fewer image removal promotion liquid of an amount, without damaging that the removal property of the image formation matter improves more, i.e., the front face of a recorded material, as compared with the case where each is independently used by using together alkyl sulfo succinate and a fluorine system surfactant in image removal promotion liquid. By using together alkyl sulfo succinate and a fluorine system surfactant in image removal promotion liquid, it is considered to be based on the following operations that the removal property of the image formation matter improves. That is, when the image removal promotion liquid containing a fluorine system surfactant is given to a recorded material, in the surface part of the recorded material from which the image formation matter was removed, a fluorine system surfactant falls the wettability to the image formation matter of the front face of a recorded material, and since re-adhesion with the image formation matter and a recorded material becomes is hard to be performed, the image removal promotion liquid which added the fluorine system surfactant has the big reattachment operation prevention effectiveness. However, when a fluorine system surfactant is independently used for image removal promotion liquid Since the wettability to a recorded material or the image formation matter is inadequate and adhesive strength of a recorded material and the image formation matter cannot fully be fallen, Although a desirable removal property is not acquired, alkyl sulfo succinate and a fluorine system surfactant by carrying out mixed use The synergistic effect with which can be satisfied of both wettability to a recorded material or the image formation matter and reattachment operation prevention effectiveness can be discovered, and the removal property of the image formation matter of having excelled extremely can be acquired.

[0015] As an example of a fluorochemical surfactant in which the aforementioned effectiveness can be brought about by this invention, cation systems, such as the Nonion systems, such as both-sexes systems, such as anion systems, such as phloroalkyl carboxylate, a phloroalkyl sulfonate, and phloroalkyl phosphoric ester, and a phloroalkyl installation betaine, a phloroalkyl ethyleneoxide addition product, phloroalkyl oligomer, and phloroalkyl amine oxide, and a phloroalkyl trimethylammonium salt, etc. are mentioned. the mixing ratio of a fluorine system surfactant and alkyl sulfo succinate -- especially the thing usually used in 0.01-5 according to conditions, such as process conditions, such as an approach for a rate to remove the image formation matter and a rate, image formation matter to be used, and a class of recorded material, although desirable range differs is desirable.

[0016] The image removal promotion liquid in this invention can also be made to contain other surfactants other than the aforementioned alkyl sulfo succinate and a fluorine system surfactant according to the purpose. As an example of other surfactants which can be added As an anionic surfactant, alkyl carboxylate, N-acylamino acid chloride, Carboxylate, such as alkyl ether acetate and acyl peptide, an alkyl sulfonate, Alkylbenzene sulfonates, alkylnaphthalenesulfonate, Sulfonates, such as sulfo succinate, alpha-olefin sulfonate, and N-acyl sulfonate, Phosphate, such as sulfate salts, such as sulfated oil, alkyl sulfate, alkyl ether sulfate, and an alkylamide sulfate, alkyl phosphate, alkyl ether phosphate, and alkyl aryl phosphate, is mentioned. As a cationic surfactant, alkylamine salt, alkyl quarternary ammonium salt, aromatic series quarternary ammonium salt, heterocycle quarternary ammonium salt, etc. are mentioned. As an amphoteric surface active agent, betaine molds, such as carboxy betaine and sulfobetaine, aminocarboxylate, an imidazoline derivative, etc. are mentioned. As a nonionic surfactant, polyoxyethylene alkyl and the aryl ether, The polyoxyethylene styrol ether, a polyoxyethylene lanolin derivative, The ethylene oxide derivative of an alkyl allyl compound formaldehyde condensate, a polyoxyethylene polyoxypropylene block copolymer, Ether systems, such as polyoxyethylene polyoxypropylene alkyl ether, Polyoxyethylene glycerine fatty acid ester, polyoxyethylene sorbitan fatty acid ester, Ether ester systems, such as polyoxyethylene sorbitol fatty acid ester, Polyethylene glycol fatty acid ester, a fatty-acid monoglyceride, polyglyceryl fatty acid ester, *****, such as ester systems, such as a sorbitan fatty acid ester, propylene glycol fatty acid ester, and cane-sugar fatty acid ester, an aliphatic series alkanol amide, polyoxyethylene fatty acid amide, polyoxyethylene alkylamine, and an alkylamine oxide, are mentioned. As a silicone system surface

active agent, a polyoxyalkylene denaturation siloxane and a carboxylation polyoxyalkylene denaturation siloxane are mentioned. Although there is especially no limit, the addition of the alkyl sulfo succinate in the image removal promotion liquid of this invention and said field side activators other than a fluorine system surfactant has the desirable thing of the whole surfactant contained in image removal promotion liquid to consider especially as 50 or less % of the weight of a content 80 or less % of the weight, when acquiring the effectiveness of both the wettability to an aforementioned recorded material and the aforementioned image formation matter, and reattachment operation prevention.

[0017] By [which are dissolved in image removal promotion liquid with the image formation matter] adding the liquefied compound of a high-boiling point comparatively, the bruise on the front face of a recorded material after removing the image formation matter can be reduced, and the removal property of the good image formation matter is acquired. Furthermore, as an image removal means, an exfoliation member and a recorded material are stuck, when using the approach of carrying out heating pressurization, the temperature which serves as image formation matter removable [the good image formation matter] by [which are dissolved] adding the liquefied compound of a high-boiling point comparatively can be lowered to image removal promotion liquid, therefore reduction of need power consumption is attained. As a compound which brings about said effectiveness and is used for this invention, 2-methoxyethanol, 2-ethoxyethanol, 2-(methoxy methoxy) ethanol, 2-isopropoxy ethanol, 2-butoxyethanol, 2-isopentyloxy ethanol, 2-phenoxyethanol, Cellosolves and furfuryl alcohol, such as 2-benzyloxy ethanol, Tetrahydrofurfuryl alcohol, the diethylene-glycol monomethyl ether, As Carew Bittor, such as diethylene glycol monoethyl ether and the diethylene-glycol monobutyl ether, or those derivatives There are 2-methoxy ethyl acetate, 2-ethoxyethyl acetate, 2-butoxy ethyl acetate, diethylene glycol monoethyl ether acetate, diethylene glycol monobutyl ether acetate, etc. Furthermore, the triethylene glycol monomethyl ether, tetraethylene glycol, 1-methoxy-2-propanol, 1-ethoxy-2-propanol, The JIPUOREN glycol monomethyl ether, the JIPUOREN glycol monoethyl ether, The TORIPUOREN glycol monomethyl ether and polyoxyethylene oxy-PUOREN derivatives 2-pyrrolidinone, N-methyl-2-pyrrolidinone, ethylene carbonate, PUOREN carbonate, gamma-butyrolactone, 1, 3-dimethyl imidazolidinone, a morpholine, gamma-valerolactone, etc. can be mentioned. Moreover, some which show the same effectiveness as the aforementioned compound are also in a surfactant as stated above. Specifically, effectiveness with same ethyleneoxide addition product of fatty alcohol, polyoxyethylene-alkyl-ether system, polyoxyethylene-polyoxypropylene-alkyl-ether system, and alkylamine oxides is shown. When the aforementioned compound is added in image removal promotion liquid, the removal property of the image formation matter good as mentioned above is acquired, or it is presumed because the aforementioned compound is plasticizing the image formation matter at the time of removal of the image formation matter that the temperature which can remove the image formation matter can be lowered.

[0018] The removal property and playback condition of the image formation matter can be improved in the image removal promotion liquid of this invention with the aforementioned surfactant etc., or physical-properties values, such as viscosity, can be adjusted to it, and a water soluble polymer can be added in order to make grant of image removal promotion liquid easy. As a water soluble polymer which can be added in image removal promotion liquid By the natural system, gum arabic, TORAGANGAMU, good AGAMU, karaya gum, Vegetable macromolecules, such as locust bean gum, arabino GARAKUTON, pectin, and KUINSU seed starch, Seaweed system giant molecules, such as an alginic acid, a carrageenan, an agar, and *****, gelatin, By microorganism system giant molecules, such as animal system giant molecules, such as casein, albumin, and a collagen, xanthene gum, and a dextran, and the semisynthesis system Methyl cellulose, ethyl cellulose, hydroxyethyl cellulose, Fibrin system macromolecules, such as hydroxypropylcellulose and a carboxymethyl cellulose (CMC), Soluble starch, carboxymethyl starch (CMS), dialdehyde starch, Starch system macromolecules, such as sodium carboxymethyl starch and sodium starch phosphate, By seaweed system macromolecules, such as sodium alginate and propylene glycol alginate, and the pure composition system Vinyl system macromolecules, such as polyvinyl alcohol, a polyvinyl pyrrolidone, and polyvinyl methyl ether, The polyacrylamide non-constructing a bridge, polyacrylic acid, and its alkali-metal salt, Acrylic resin, such

as water-soluble styrene acrylic resin, water-soluble styrene maleic resin, Water-soluble vinyl naphthalene acrylic resin, water-soluble vinyl naphthalene maleic resin, Naturally-occurring-polymers compounds which have the salt of cationic functional groups, such as a polyvinyl pyrrolidone, polyvinyl alcohol, an alkali-metal salt of beta-naphthalene sulfonic-acid formalin condensate, the fourth class ammonium, and an amino group, in a side chain, such as a high molecular compound and a shellac, are mentioned. Although the addition to the image removal promotion liquid of these water soluble polymers changes with approaches of giving image removal promotion liquid to a recorded material, it is preferably added in 0.1 - 10% of the weight of the range 0.1 to 20% of the weight. pH regulator is one of those are added by other image removal promotion liquid. The preservation stability of this liquid can be improved by adjusting pH of image removal liquid to 5-8. By five or less pH, ***** is bad and it is easy to generate rust, and in eight or more pH, the ester added by image removal promotion liquid hydrolyzes, and physical properties change. However, as a class of pH regulator, if a bad influence can be adjusted to ***** and pH can be adjusted to image removal promotion liquid 5-8, pH adjustment matter of arbitration can be used. As the example, the carbonate of alkali metal, such as the hydroxide of alkali metals, such as amines, such as diethanolamine and triethanolamine, a lithium hydroxide, a sodium hydroxide, and a potassium hydroxide, ammonium hydroxide, the 4th class ammonium hydroxide, the 4th class phosphonium hydroxide, a lithium carbonate, a sodium carbonate, and potassium carbonate, etc. is mentioned.

[0019] A preservation-from-decay antifungal agent is mentioned to the image removal promotion liquid of this invention as a compound of others which can be added. As the example, sodium dehydroacetate, sodium sorbate, 2-pyridine thiol-1-oxide sodium, sodium benzoate, pentachlorophenol sodium, etc. can use it for this invention. As a chelating reagent added by image removal promotion liquid as an exfoliation assistant with the encapsulant of a heavy metal ion, there are ethylenediaminetetraacetic acid sodium, nitrilotriacetic acid sodium, hydroxyethyl ethylenediamine triacetic-acid sodium, diethylenetriamine pentaacetic acid sodium, URAMIRU sodium diacetate, etc., for example. A bleaching agent can be added in order to, improve the whiteness degree of the recorded material after playback in addition to this by using for example, an acid sulfite, a sodium thiosulfate, thiodiglycolic acid Amon, a diisopropyl ammonium nit light, pentaerythritol tetranitrate, a dicyclohexyl ammonium nit light, etc. as a rusr-proofer. Specifically, a hydrogen peroxide, a sodium peroxide, a fault sodium carbonate, a sodium hypochlorite, etc. are mentioned as oxidative bleachings. Fluorescent dye, a blueness attachment color, an enzyme, etc. can also be added. Furthermore, by the electrophotography method, the rosin (abietic acid) derivative may contain as various waxes and a binder as a vehicle in an electric charge control agent and hot printing ink.

[0020] Next, the playback approach of the recorded material of this invention is explained in detail. In the playback approach of the recorded material of this invention, a grant means gives image removal promotion liquid to a recorded material. After making image removal promotion liquid adhere to the approach and roller which are made to dip a recorded material in the image removal promotion liquid in a container, and are given to it as the concrete grant approach, the approach and image removal promotion liquid which a roller is contacted to a recorded material and apply it are made into the shape of the shape of a fog, and a globule, and there is the approach of injecting and giving towards a recorded material etc. The volume to give is the range which can remove the image on a recorded material completely, and it is desirable to press down to the minimum so that many aforementioned problems accompanying making image removal promotion liquid give in large quantities may not arise. The component in liquid may cause the problem of poor writing at the time of reuse, and poor fixing of image removal promotion liquid by remaining in the recorded material after regeneration. Therefore, as for the compound which image removal promotion liquid, such as a surfactant, is made to contain, it is desirable to press down the image formation matter on a recorded material to the minimum concentration in the completely removable range similarly. Although the class of the purpose, the target image formation matter, or recorded material and the process which removes the image formation matter more specifically differ from the range which can be used by the approach of giving image removal promotion liquid For example, when using one sort of image removal promotion liquid, as alkyl sulfo

succinate concentration in image removal promotion liquid, it is desirable to be prepared in 0.01 to 20% of the weight of the range, and 0.1 to 10% of the weight of the range is especially desirable by the aforementioned reason. As compared with the case where the image removal promotion liquid which does not use alkyl sulfo succinate especially is used although it is desirable as an amount of grants of image removal promotion liquid to use in the range of 800microg/cm² to 8 mg/cm² (from 0.5g per A4 seal to 5g), the case where it considers as the amount of grants below 3.2 mg/cm² (2g per A4 seal) as mentioned above has large effectiveness.

[0021] Although the approach of the removal property of the image formation matter improving, or these people dividing the process which gives the image removal promotion liquid which consists of the same component as an approach of acquiring the effectiveness that the amount of the image removal promotion liquid used can be reduced to a recorded material, and giving the image removal promotion liquid of multiple times to the same recorded material was proposed previously. The further excellent property is acquired by the approach of giving the image removal promotion liquid of this invention to such a recorded material by multiple times. Moreover, the removal property of the image formation matter has improved, and these people proposed the approach using two or more sorts of image removal promotion liquid with the low concentration liquid which consists of the high concentration liquid which contains a surfactant by 5 to 100% of the weight of high concentration, a water-soluble liquid which contains a surfactant by less than 5% of the weight of low concentration, or water as an approach the effectiveness that the amount of the image removal promotion liquid used can be reduced becomes still larger. By using the image removal promotion liquid containing alkyl sulfo succinate by this approach, the aforementioned effectiveness becomes large and the removal property of the more nearly little and good image formation matter is acquired. That is, in this approach, two or more sorts of image removal promotion liquid with the low concentration liquid which consists of the water-soluble liquid or water which contains the high concentration liquid which contains alkyl sulfo succinate at least by 5 to 100% of the weight of high concentration, alkyl sulfo succinate, and/or other surfactants by less than 5% of the weight of low concentration is used. After giving a high concentration liquid to the field holding the image formation matter of a recorded material in the range of 16microg/cm² to 1.6 mg/cm² (from 0.01g per A4 seal to 1g), by giving a low concentration liquid in the range of 16microg/cm² to 3.2 mg/cm² (from 0.01g per A4 seal to 2g), degradation of a recorded material cannot be caused but the especially excellent playback quality can be acquired. When the total amount of the image removal promotion liquid given to a recorded material when the alkyl sulfo succinate in a high concentration liquid is less than 5 % of the weight is made little, removal of the image formation matter is not fully made. Especially the concentration of a desirable high concentration liquid is 5 % of the weight - 50 % of the weight from that removal of the good image formation matter is possible, that the proper physical-properties value which gives liquid to a recorded material is acquired, and the repeat of playback by removal of image formation and the image formation matter being made many times using the same recorded material. Moreover, although it is the conditions which the image formation matter can exfoliate as a low concentration water solubility liquid when alkyl sulfo succinate and/or other surfactants are carried out to 5% of the weight or more, the property of the reproduced recorded material changes and the problem of note nature and the image quality at the time of reuse deteriorating arises. In order to attain that removal of the perfect image formation matter is possible, and that the quality of the recorded material with which the above was reproduced is good, and repeat playback and use are possible, alkyl sulfo succinate and/or other surfactant density ranges are 1 or less % of the weight as a low concentration water solubility liquid. The image formation matter is fully unremovable from a recorded material in the amount of grants to the recorded material of a high concentration liquid or a low concentration liquid being more nearly little than 16microg/cm² (0.01g per A4 seal). If a high concentration liquid is given to a recorded material more than 1.6 mg/cm² (1g per A4 seal), the property of the recorded material reproduced as mentioned above will change, and will become unsuitable to reuse of the reproduced recorded material.

[0022] The exfoliation member which has the playback approach of the recorded material of this invention used is more concretely explained based on an operation of the regenerative apparatus shown

in drawing 1 . It is led to an exfoliation member roller (1-5) with a conveyance roller (1-4) through a guide plate (1-3) with a feed roller (1-2) from the medium tray (1-1) which supplies the recorded material which has the surface containing the water with which the image formation matter of the shape of a coat, such as a toner of electrophotography and hot printing ink, was formed, such as a cellulose, which carries out liquid swelling. The image removal promotion liquid (1-7) which contains alkyl sulfo succinate with a liquid supply roller (1-6) is applied to the front face of this exfoliation member roller (1-5), and spreading sinking in of the image removal promotion liquid (1-7) is carried out at the recorded material conveyed from said conveyance roller (1-4). The recorded material which spreading sinking in of the image removal promotion liquid (1-7) is carried out, and touches the exfoliation member is separated from an exfoliation member by the separation pawl (1-9), after heating pressurization is carried out with a heating roller (1-8). By carrying out heating pressurization with an exfoliation member roller (1-5), adhesive strength arises between the image formation matter on a recorded material, and an exfoliation member roller (1-5). Since the adhesive strength of a recorded material and the image formation matter has become weaker by giving image removal promotion liquid to a recorded material, if a recorded material is separated from an exfoliation member roller (1-5), the image formation matter will be imprinted from a recorded material to an exfoliation member roller (1-5) side, and the image formation matter on a recorded material will be removed from a recorded material. With a conveyance roller (1-11), the recorded material from which the image was removed is led on a desiccation belt (1-12), and is dried. The recorded material of the dried non-image is discharged by the paper output tray (1-13) with a conveyance roller (1-11), and the recorded material in which a re-copy and re-printing are possible is obtained. The image formation matter on the exfoliation member roller (1-5) with which the image was imprinted fails to be scratched from the front face of an exfoliation member roller (1-5) in the cleaning section (1-10), and an exfoliation member roller (1-5) is again used for image removal.

[0023] The regenerative apparatus shown in drawing 2 is the example of another equipment which can enforce the playback approach of the recorded material concerning this invention. Explanation is further added about the playback approach of this invention by actuation of this equipment. The equipment of drawing 2 consists of each unit of 1, 2, 3, 4, and 5. In the feed unit 1, it is accumulated on a bottom plate 101 and paper is fed to the recorded material 10 with which the image was formed with the feed roller 102 from the topmost thing. In the image removal promotion liquid grant unit 2, the recorded material 10 with which it was fed from the feed unit 1 It is made to show around into the image removal promotion liquid 20 containing the alkyl sulfo succinate of the liquid container 201 by the conveyance-among liquid roller 202, and the guide plate 203 in liquid. the squeezing roller pair after being dipped into image removal promotion liquid 20 – excessive image removal promotion liquid 20 is removed by 204, and it is conveyed to the following image formation matter exfoliation unit 3. The image formation matter exfoliation unit 3 is equipped with the separation pawl 303 arranged so that the front face of one pair of exfoliation member rollers 302 which contained the heat lamp 301 and have been arranged in the state of a pressure welding, and the exfoliation member roller 302 near [by the side of transfer paper discharge] the pressure-welding section may be contacted, the cleaning equipment 304 which cleans the front face of the exfoliation member roller 302, a mechanical component (not shown), etc. Cleaning equipment 304 is equipped with the image formation matter receptacle 307 (not shown) which holds the image formation matter which it failed to scratch with the scraper blade 306 which fails to scratch the image formation matter on the cleaning roller 305 from which the image formation matter on the front face of the exfoliation member roller 302 is removed, and a cleaning roller 305, and the scraper blade 306. The recorded material with which image removal promotion liquid was given is conveyed by the nip of the exfoliation member roller 302, and is heated and pressurized. By carrying out heating pressurization of the recorded material with the exfoliation member roller 302, adhesive strength arises like the case of drawing 1 between the image formation matter on a recorded material, and an exfoliation member roller (1-5). Since the adhesive strength of a recorded material and the image formation matter has become weaker by giving image removal promotion liquid to a recorded material, if a recorded material is separated from the exfoliation member roller 302, the image formation matter will be

imprinted from a recorded material to the exfoliation member roller 302 side, and the image formation matter on a recorded material will be removed from a recorded material. In the desiccation unit 4, a recorded material 10 is dried by passing through between the nips formed with the desiccation roller 403 which contains a heat lamp 401, for example, adjoins the desiccation roller 402 which consists of aluminum, and this, and a reusable recorded material is reproduced. In the paper receptacle unit 5, the recorded material discharged from the desiccation unit 4 is stocked by the paper output tray 501.

[0024] The example of the regenerative apparatus for enforcing the approach of repeating separation of adhesion to the exfoliation member of the image formation matter, an exfoliation member, and a recorded material two or more times about the same recorded material in removal actuation of the image formation matter to drawing 3 is shown. Removal actuation of the image formation matter of drawing 3 is performed in the exfoliation unit 3. The exfoliation unit 3 consists of the endless belt 308 and 309 grades which were spread around so that the separation rollers 306 of 305 or 1 pair of entry roller of 302 or 1 pair of two or more heating / pressurization rollers having a heat lamp 301 and these rollers might be inscribed in. An endless belt 309 is an exfoliation member belt, and its adhesive strength with the image formation matter is comparatively large. For example, it is formed by polymers, such as polyethylene terephthalate, a polyethylene NAFUCHI rate, and a polycarbonate. In the entry roller 305 section, while it had been pinched among endless belts 308 and 309, the recorded material with which image removal promotion liquid was given is conveyed, until it is inserted among endless belts 308 and 309 and results in the separation roller 306 section. Since a recorded material is heated with heating / pressurization roller 302, the image formation matter becomes soft in the meantime and it is pressurized by the exfoliation member belt, the image formation matter is pasted up on an exfoliation member. As shown in drawing, one pair of belts are twisted around the roller arranged at JIGUZAKU, and if it conveys pinching a recorded material between one pair of belts, the difference of a bearer rate will arise between a recorded material and a belt. The difference of a bearer rate means that separation with a recorded material and an exfoliation member has arisen in micro. The image formation matter is imprinted from a recorded material by separation with this micro recorded material and an exfoliation member to an exfoliation member side. In the equipment of the configuration of drawing 3, while the recorded material had been pinched among endless belts 308 and 309 and being conveyed, an imprint is repeated to an exfoliation member side from adhesion to the exfoliation member belt 309 of the aforementioned image formation matter, and a recorded material. In this invention, when removal actuation of such image formation matter is made, it becomes possible to remove the image formation matter by grant of image removal promotion liquid little as mentioned above, without damaging the front face of a recorded material 10 by using the liquid which contains alkyl sulfo succinate as image removal promotion liquid. In addition, the liquid grant unit 2 of drawing 3 consists of the liquid container 201, the liquid pumping roller 207, a liquid spreading roller 208, and presser-foot roller 209 grade, and the image removal promotion liquid pumped up with the liquid pumping roller 207 out of the liquid container 201 is extracted and quantified between the liquid spreading rollers 208, and is given to the recorded material which presses down with the liquid conveyance roller 208 and is conveyed between rollers 209. Moreover, in order to perform grant to the image removal promotion liquid to a recorded material two or more times to the same recorded material, not only one but two or more stations can be prepared for the grant station of the image removal promotion liquid which becomes the liquid grant unit section from the liquid container 201, the liquid pumping roller 207, the liquid spreading roller 208, and presser-foot roller 209 grade. Although the example was given only about the approach of removing and pressurizing the image formation matter and imprinting to an exfoliation member as equipment for enforcing the playback approach of the recorded material of the above this invention The removal approach of the image formation matter in this invention The method of grinding against a brush not the thing limited to this but the recorded material which gave the image removal promotion liquid containing alkyl sulfo succinate that other means of imprinting to an adhesive exfoliation member remove the image formation matter is also included in the range of this invention. Next, although the example of this invention is shown more concretely, this invention is not limited to these examples. In addition, % shows weight %.

[0025]

[Example]

Toner A was produced by the example of reference 1 <electrophotography toner formula> following formula.

Polyester resin (Binding resin) 43% Styrene acrylic resin (Binding resin) 43% ** Cr monoazo color (Electric charge control agent) 3% Carnuba wax (Release agent) 4% Carbon black (coloring agent) After mixing 7% or more of matter with a blender for 10 minutes, melting kneading was carried out with the roll of two heated at 120-140 degrees C. Coarse grinding of the kneading object was carried out by the cutter mill after natural radiationnal cooling, and the toner with a volume mean particle diameter of 10 micrometers was obtained after grinding using pneumatic elutriation with the grinder using a jet stream.

Toner B was produced by the <electrophotography toner formula> following formula.

Polyester resin (Binding resin) 70% Styrene acrylic resin (Binding resin) 16% Salicylic-acid-derivatives zinc salt (electric charge control agent) 3% Carnuba wax (Release agent) 4% Carbon black (coloring agent) After mixing 7% or more of matter with a blender for 10 minutes, melting kneading was carried out with the roll of two heated at 120-140 degrees C. Coarse grinding of the kneading object was carried out by the cutter mill after natural radiationnal cooling, and the toner with a volume mean particle diameter of 8 micrometers was obtained after grinding using pneumatic elutriation with the grinder using a jet stream.

Hot melt ink C was produced by the <formula of hot melt ink> following formula.

The Rhodamine B lake pigment 3% C.I. solven tread 49 0.5% Dense low 48% Paraffin wax 10% Octadecanamide 36.3% 1.8% (molecular weight 3000 [about]) 2 of vinyl acetate-ethylene copolymers-t-butyl-4-methoxyphenol 0.38% Heating the mixture of the 3-t-butyl-4-methoxyphenol 0.02% above-mentioned formula at 130 degrees C, the churning dissolution was distributed and carried out with the ball mill, centrifugal separation was performed at the time of heat, grain of maximum size was removed, and the hot melt ink constituent C was obtained.

[0026] The churning dissolution of the constituent of the example 1 following formula was carried out, 10% liquid of lithium hydroxides adjusted, and image removal promotion liquid 1 was produced so that it might be set to pH8.

A compound (1-A) 1% 2-propanol 1% Dehydroacetic-acid Na 0.1% A lithium hydroxide 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality A with the PPC copying machine of an electrophotography method using the toner A produced by the residue above-mentioned formula, it was made the equipment shown in drawing 1 one set of said image removal promotion liquid, and regenerated at 130 degrees C whenever [processing speed 20 mm/sec and stoving temperature]. The amount of grants of liquid 1 was set to 4.5g, using polyethylene terephthalate as an exfoliation member. The toner of the amount which poses a real use top problem did not remain in the reproduced paper. When the reuse was carried out with the aforementioned copying machine using the reproduced paper, the copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained. The condition of playback of a recorded material was similarly investigated about examples 2-12 and the examples 1-13 of a comparison.

[0027] The churning dissolution back was produced by the example 2 following formula, and image removal promotion liquid 2 was produced as pH9 by the sodium hydroxide.

A compound (1-C) 2% 25% (2-A) water solution of compounds 0.8% Ethanol 2% Sorbic-acid Na 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality B with the PPC copying machine of an electrophotography method using the residue toner B, it regenerated using said image removal promotion liquid 2 like the example 1. At this time, the amount of grants of liquid 2 was 3.8g.

The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0028] The churning dissolution back was produced by the example 3 following formula, and image removal promotion liquid 3 was produced as pH9 with the lithium hydroxide.

Compound (1-G) 0.5% SOFUTA Norian 70 0.5% (NIPPON SHOKUBAI make: polyoxyethylene-alkyl-ether system surfactant)

25% (2-C) water solution of compounds 0.1% Benzoic acid Na 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality A like the residue example 1, it regenerated using said image removal promotion liquid 3 like the example 1. At this time, the amount of grants of liquid 3 was 4.5g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0029] The churning dissolution back was produced by the example 4 following formula, and image removal promotion liquid 4 was produced as pH8 with the lithium hydroxide.

A compound (1-I) 0.3% SOFUTA Norian 120 (NIPPON SHOKUBAI make) 0.5% Pentachlorophenol Na 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality B like the residue example 2, it regenerated using said image removal promotion liquid 4 like the example 1. At this time, the amount of grants of liquid 4 was 4.0g. The remainder of a toner was not observed by the obtained paper. When the reuse was carried out with the aforementioned copying machine using the reproduced paper, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0030] Image removal promotion liquid e was produced by the example 5 following formula.

A compound (1-H) 1% A compound (1-B) 0.2% Fault sodium carbonate 0.1% 2-pyridine thiol-1-oxide Na 0.1% Pure water The hot melt ink jet printer of the mold on demand using a well-known piezoelectric device is used. a residue -- It heated so that a head might become 120 degrees C, and the head was filled up with the aforementioned ink C, and it regenerated using said image removal promotion liquid 5 like the example 1 about what printed to up to commercial A4 seal paper of fine quality C. At this time, the amount of grants of liquid 5 was 4.3g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper

was obtained.

[0031] The churning dissolution back was produced by the example 6 following formula, and image removal promotion liquid 6 was produced as pH7 by the sodium hydroxide.

The air roll OP (Toho Chemical make) 1% Polyvinyl alcohol 0.5% Pentachlorophenol Na 0.1% Pure water After forming an image in commercial A4 seal high-quality paper like the residue example 1, image removal promotion liquid 6 was set in the equipment shown in drawing 2, and it regenerated using it. At this time, the amount of grants of liquid 6 was 4.2g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0032] Image removal promotion liquid 7 (pH8) was produced by the example 7 following formula. Aerosol MA 80 (Mitsui Cyanamid make) 1% N-methyl-2-PIROJINON 1% Ethanol 1% A benzoic acid Na 0.1% CMC 0.2% Water After forming an image on commercial A4 seal paper of fine quality B like the residue example 2, it regenerated using said image removal promotion liquid 7 like the example 6. At this time, the amount of grants of liquid 7 was 4.0g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0033] Produced the churning dissolution back by the example 8 following formula, and produced image removal promotion liquid 8 as pH9 by the sodium hydroxide. A compound (1-F) 1% S145 (Asahi glass) 1.5% Pentachlorophenol Na 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality C like the residue example 5, it regenerated using said image removal promotion liquid 8 like the example 6. At this time, the amount of grants of liquid 8 was 4.0g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0034] Produced the churning dissolution back by the example 9 following formula, and produced image removal promotion liquid 9 as pH7 by the sodium hydroxide. Aerosol OT 100 (Mitsui Cyanamid make) 1% S113 (Asahi glass) 1.5% Pentachlorophenol Na 0.1% pure water After forming an image on commercial A4 seal paper of fine quality A like the residue example 1, it regenerated using the equipment and the image removal promotion liquid 9 which are shown in drawing 3. The equipment shown in drawing 4 (a) here was replaced with and built into the image removal promotion liquid grant unit in drawing 3, and image removal promotion liquid 9 was given in 2 steps. At this time, the amount of grants of liquid 9 was 2.3g in total. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the

above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0035] Produced the churning dissolution back by the example 10 following formula, and produced image removal promotion liquid 10 as pH7 with the lithium hydroxide. Aerosol MA 80 (Mitsui Cyanamid make) 1% BT-5 (made in Nikko Chemicals:) [polyoxyethylene] An alkyl ether system surfactant 1% Sodium sorbate 0.1% Pure water After forming an image on commercial A4 seal paper of fine quality A like the residue example 1, it regenerated using the equipment and the image removal promotion liquid 10 which are shown in drawing 2 . At this time, the amount of grants of liquid 10 was 4.0g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0036] Produced the churning dissolution back by the example 11 following formula, and produced image removal promotion liquid 11 (high concentration liquid) as pH7 with the lithium hydroxide. Aerosol MA 80 (Mitsui Cyanamid make) 10% BT-5 (made in Nikko Chemicals:) [polyoxyethylene] An alkyl ether system surfactant 10% Sodium sorbate 0.1% Pure water After forming an image on A4 seal high-quality in the paper [commercial / A] like the residue example 1, it regenerated using the equipment and the image removal promotion liquid 11 which are shown in drawing 2 . Exfoliation was performed, after having replaced with and built into the image removal promotion liquid grant unit in drawing 2 the equipment shown in drawing 4 (b) here, and the roller gave 0.06g of image removal promotion liquid 11, and making water into the shape of a fog and giving it 1.4g next. The remainder of a toner was not observed by the obtained paper. When the reuse was carried out with the aforementioned copying machine using the reproduced paper, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0037] Produced the churning dissolution back by the example 12 following formula, and produced image removal promotion liquid 12 (high concentration liquid) as pH8 by the sodium hydroxide. Aerosol OT 100 (Mitsui Cyanamid make) 20% 2-pyridine thiol-1-oxide Na 0.1% pure water After forming an image on A4 seal high-quality in the paper [commercial / B] like the residue example 2, it regenerated using the equipment and the image removal promotion liquid 12 which are shown in drawing 3 . Exfoliation was performed, after having replaced with and built into the image removal promotion liquid grant unit in drawing 3 the equipment shown in drawing 4 (b) here, and the roller gave 0.1g of image removal promotion liquid 12, and making water into the shape of a fog and giving it 1.1g next. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost

equivalent to an intact high-quality thing in the paper was obtained.

[0038] Produced the churning dissolution back by the example 13 following formula, and produced image removal promotion liquid 13 (high concentration liquid) as pH8 by the sodium hydroxide. Aerosol OT 100 10% A perfluoroalkyl carboxylic acid 10% 2-pyridine thiol-1-oxide Na 0.1% Pure water After forming an image on A4 seal high-quality in the paper [commercial / B] like the residue example 11, it regenerated using the equipment and the image removal promotion liquid 13 which are shown in drawing 3 . Exfoliation was performed, after the roller's having given 0.08g of image removal promotion liquid 13, and making water into the shape of a fog and giving it 0.9g next. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0039] Produced the churning dissolution back by the example 14 following formula, and produced image removal promotion liquid 14 (high concentration liquid) as pH8 by the sodium hydroxide. Aerosol OT 100 10% A perfluoroalkyl carboxylic acid 10% 2-propanol 5% 2-pyridine thiol-1-oxide Na 0.1% Pure water After forming an image on A4 seal high-quality in the paper [commercial / B] like the residue example 11, it regenerated using the equipment and the image removal promotion liquid 14 which are shown in drawing 3 . Exfoliation was performed, after the roller's having given 0.06g of image removal promotion liquid 14, and making water into the shape of a fog and giving it 0.5g next. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0040] The image removal promotion liquid 14 of example 15 example 14 publication was made into the 1st step, and the image removal promotion liquid 5 of example 5 publication was made into the 2nd step, and like the example 14, 0.05g was given to the 1st step and it regenerated in the amount of liquid grants of 0.4g to the 2nd step. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained.

[0041] Produced the churning dissolution back by the example 16 following formula, and produced image removal promotion liquid 16 (high concentration liquid) as pH9 with the lithium hydroxide. Aerosol MA 80 (Mitsui Cyanamid make) 1% Ethylene carbonate 2% 1, 3-dimethyl imidazolidinone 2% Sodium sorbate 0.1% Pure water After forming an image in commercial A4 seal high-quality paper A like the residue example 1, it regenerated using the equipment and the image removal promotion liquid 16 which are shown in drawing 2 . At this time, the amount of grants of liquid 16 was 3.2g. The remainder of a toner was not observed by the obtained paper. When the reuse of the reproduced paper was carried out with the aforementioned copying machine, the beautiful copy image equivalent to intact paper was able to be obtained. When regenerated like the above to the paper by which the reuse was

carried out, the toner of the amount which poses a real use top problem did not remain in the paper reproduced similarly. Then, although image formation and regeneration were repeated and were performed 3 times, also when the remainder of a toner was not observed by the paper reproduced also in which time but image formation was performed, the beautiful copy image almost equivalent to an intact high-quality thing in the paper was obtained. When image elimination is performed, there is no toner after-image, and it was able to reuse. When image elimination was performed, there was no after-image of an image, and the re-copy was possible.

[0042] Except having changed into BT5 (made in Nikko Chemicals: 2nd class alkyl ether system surfactant trade name of PENTA oxyethylene) except for the compound (1-A) of the image removal promotion liquid 1 of example of comparison 1 example 1, image removal promotion liquid a was produced similarly, and image reconstruction processing was performed like the example 1 using this image removal promotion liquid. Since the amount of grants of the image removal promotion liquid a at this time had low permeability, it was 2.5g. It was what the after-image of a toner image is accepted in the paper obtained after regeneration, and cannot bear a reuse.

Except having changed into SOFUTA Norian 300 (2nd class alkyl ether system surfactant trade name of the NIPPON SHOKUBAI polyoxyethylene) except for the compound (1-E) of the image removal promotion liquid 2 of example of comparison 2 example 2, image removal promotion liquid b was produced similarly, and regeneration was performed like the example 2 using this image removal promotion liquid. Probably because the amount of grants of the image removal promotion liquid b at this time had low permeability, it was 3.0g. It was what the after-image of a toner image is accepted in the paper obtained after regeneration, and cannot bear a reuse. When commercial high-quality image elimination in the paper was similarly performed as image removal promotion liquid b, the after-image of a toner image was accepted slightly.

[0043] Except having removed (1-G) of the image removal promotion liquid 3 of example of comparison 3 example 3, image removal promotion liquid c was produced similarly, and regeneration was performed like the example 3 using this image removal promotion liquid. The amount of grants of the image removal promotion liquid c at this time was 3.1g. The after-image of a toner image was accepted in the paper obtained after regeneration. Moreover, since the remarkable coloring considered to be based on an electric charge control material was seen, the part into which the toner exfoliated was also what cannot bear a reuse.

[0044] Except having removed (1-I) of the image removal promotion liquid 4 of example of comparison 4 example 4, image removal promotion liquid d was produced similarly, and regeneration was performed like the example 4 using this image removal promotion liquid. The amount of grants of the image removal promotion liquid d at this time was 3.5g. The after-image of a toner image was accepted in the paper obtained after regeneration.

[0045] Except for the aerosol OP of the image removal promotion liquid 6 of example of comparison 5 example 6, except [which used the sorbitan fatty acid ester as a surface active agent] having been, image removal promotion liquid e was produced similarly, and regeneration was performed like the example 6 using this image removal promotion liquid. Since the image removal promotion liquid e at this time was inferior to permeability, the amount of grants was 2.3g. In the image section, especially image removal promotion liquid e had not permeated the interior of paper. The front face of paper had separated over the whole surface centering on the place with an image, and the paper obtained after regeneration was what cannot bear a reuse.

[0046] Except for the aerosol MA 80 of the image removal promotion liquid 7 of example of comparison 6 example 7, except [which used polyethylene glycol fatty acid ester as a surface active agent] having been, image removal promotion liquid f was produced similarly, and regeneration was performed like the example 7 using this image removal promotion liquid. The amount of grants of image removal promotion liquid f was 3.0g. It was what the after-image of a toner image is accepted in the paper obtained after regeneration, and cannot bear a reuse.

[0047] Except for the compound (1-F) of the image removal promotion liquid 8 indicated in the example of comparison 7 example 8, except having used propylene glycol fatty acid ester, image removal

promotion liquid g was produced similarly, and regeneration was performed like the example 8 using this image removal promotion liquid. The amount of grants of image removal promotion liquid g was 2.4g. Since liquid did not permeate the interface of the image formation matter and paper, the paper front face of a part where the after-image of a toner image was accepted in the paper obtained after regeneration, and the image was removed was also that to which fiber cannot bear reuses, such as hair Hadachi intermediary ****.

[0048] Except for MA80 of the image removal promotion liquid 10 indicated in the example of comparison 8 example 11, image removal promotion liquid h was similarly produced except having used polyoxyethylene fatty acid amide as a surface active agent, using this image removal promotion liquid, at this time, 0.05g of the 1st step of liquid 18 adhered, and 0.7g of the 2nd step of pure water adhered regeneration on the conditions as an example 10 that regeneration is the same. The paper front face of a part where the after-image of a toner image was accepted in the paper obtained after regeneration, and the image was removed was also that to which fiber cannot bear reuses, such as hair Hadachi intermediary ****.

[0049] Except for OT100 of the image removal promotion liquid 12 indicated in the example of comparison 9 example 12, except having used the propylene glycol fatty-acid-ester community, image removal promotion liquid i was produced similarly, and the image in the commercial high-quality paper was removed like the example 12 using this image removal promotion liquid. 0.07g of the 1st step of image removal promotion liquid i adhered, and 0.5g of the 2nd step of water adhered here. It remained in the paper obtained after regeneration without a toner image's exfoliating. When an image was removed using this image removal promotion liquid, although recycled paper equivalent to an example 12 is obtained, 0.09g image removal promotion liquid and 2.3g water were required. Furthermore, electric energy also increased with the increment in need volume.

[0050] the amount of grants of the 1st step image removal promotion liquid 14 of example of comparison 10 example 15 is set to 0.05g, and the same as an example 15 in the 2nd step of image removal promotion liquid 5 -- it regenerated by giving 0.4g. Although processed like the example 15, the paper obtained after regeneration was what almost all toners remain and cannot bear a reuse.

[0051] Except having set the amount of grants of the 1st step image removal promotion liquid 14 of example of comparison 11 example 15 to 2g, when regenerated on the same conditions as the example 10 of a comparison, almost all toners were completely removed from the paper after regeneration.

However, when image formation described in the example 2 was performed in in the paper it regenerated by doing in this way, fixing of a toner was bad to it and an image was not finely formed in it. Moreover, when it wrote down on the paper which it regenerated by doing in this way by water color ink, a blot was not able to bear use severely.

[0052]

[Effect]

(1) Since the image removal promotion liquid containing alkyl sulfo succinate is used according to this invention and the wettability to the image formation matter or a recorded material and the permeability to a recorded material improve, the need volume of the image removal promotion liquid which regeneration takes can be reduced, and improvement in the speed of regeneration is attained.

(2) According to this invention, since it has the operation to which alkyl sulfo succinate prevents the reattachment to the recorded material of the image formation matter, also when the amount of grants of image removal promotion liquid is made little, it becomes possible to remove the image formation matter from a recorded material, without there being no remainder of the image formation matter, and hurting one's front face of the recorded material after playback.

(3) The above (1) and the effectiveness of (2) are not only large, but according to this invention, it can offer image removal promotion liquid excellent in a preservation property or safety by adding alkyl sulfo succinate in image removal promotion liquid.

(4) According to this invention, image removal promotion liquid excellent in the stability of the property of image removal with the passage of time can be offered by choosing a cation according to claim 4 as counter ion of said compound (1).

(5) Also when according to this invention the reattachment of the image formation matter to a recorded material is prevented still more effectively and makes little the amount of grants of image removal promotion liquid by adding a fluorochemical surfactant in image removal promotion liquid in addition to alkyl sulfo succinate, it becomes possible to remove the image formation matter from a recorded material, without there being no remainder of the image formation matter, and hurting one's front face of the recorded material after playback.

[0053] (6) By adding the compound which plasticizes the image formation matter in image removal promotion liquid in addition to alkyl sulfo succinate according to this invention, it becomes possible to press down damage on the front face of a recorded material. Moreover, when exfoliating by pasting up an exfoliation member and the image formation matter with heating, it becomes possible to fall temperature required for exfoliation, and the power consumption which playback of a recorded material takes can be reduced, or a heat-resistant limit of the member used for a regenerative apparatus can be eased.

(7) While becoming possible to remove the image formation matter from a recorded material according to this invention, without there being no remainder of the image formation matter, and hurting one's front face of the recorded material after playback by adding aliphatic series monohydric alcohol in image removal promotion liquid in addition to alkyl sulfo succinate, it enables after [with the passage of time] to remove the image formation matter from a recorded material good. Reliable image removal promotion liquid can be offered.

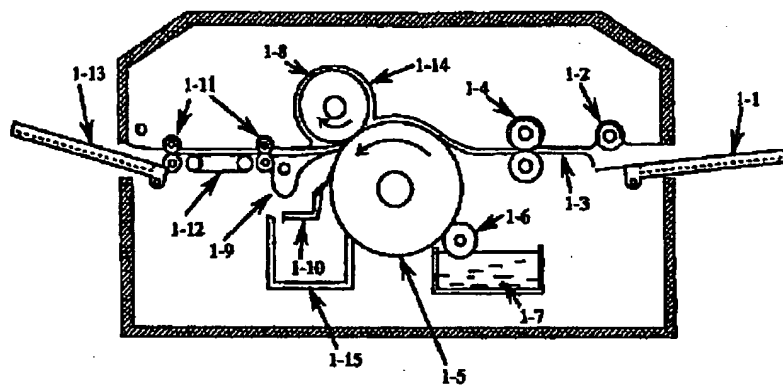
(8) It becomes possible to remove the image formation matter from a recorded material, without image removal promotion liquid's tending to permeate the contact of the image formation matter and a recorded material, and there being no remainder of the image formation matter by grant of little image removal promotion liquid, and hurting one's front face of the recorded material after playback, since according to this invention image removal promotion liquid is divided into multiple times to the same recorded material and it is given.

(9) According to this invention, use the image removal promotion liquid which contains alkyl sulfo succinate at least. The approach of giving image removal promotion liquid is divided and given to multiple times to the same recorded material. And since the content concentration of the alkyl sulfo succinate and other surfactants in the image removal promotion liquid divided and given to multiple times becomes low as it becomes grant of a back process Since the image removal promotion liquid of degree process is supplied to the recorded material to which wettability fully became high with the image removal promotion liquid given previously, Also when little image removal promotion liquid is given, it becomes possible to remove the image formation matter from a recorded material, without image removal promotion liquid's tending to permeate the contact of image removal promotion liquid and a recorded material, and there being no remainder of the image formation matter, and hurting one's front face of the recorded material after playback. Furthermore, since the total amount of the surfactant used for one playback actuation can be reduced, degradation of the image formation matter the note nature of the reproduced recorded material, fixable can be prevented, and the cycle of playback and reuse can be repeated repeatedly.

(10) between the recorded material which was stuck according to this invention, and exfoliation members -- ", when it is what is depended on the approach which shifts, produces and cheats out of "and adhesion to an exfoliation member and exfoliation of the image formation matter of multiple times produce It becomes possible to remove the image formation matter from a recorded material, without there being no remainder of the image formation matter, and hurting one's front face of the recorded material after playback, when little image removal promotion liquid is given especially.

(11) According to this invention, an exfoliation property can be improved by adding a water soluble polymer in image removal promotion liquid, properties, such as reinforcement of the recorded material after playback, can be improved, and the application of reuse can be spread.

[Translation done.]



[Translation done.]